

RECENT OBSERVATIONS OF *HIPPOBOSCA EQUINA* L. (DIPTERA: HIPPOBOSCIDAE) IN SOUTH DEVON

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Widespread in the Palaearctic region (Soos & Papp, 1986), *Hippobosca equina* L. is the only member of this genus likely to be encountered in the wild in the UK, although *H. longipennis* Fab. has been recorded on imported animals (cheetahs and other carnivores) on a number of occasions (Hutson in Chandler, 1998), and most recently from Ireland (O'Connor & Sleeman, 1987). Historically *H. equina* has been recorded from many of the southern counties of England, westwards through much of Wales and north to Lincolnshire and Edinburgh, although the latter record is considered dubious (Hutson, 1984). In recent years, *H. equina* has been frequently recorded only from the New Forest with occasional records from the southern counties. Hutson (1984) found *H. equina* to be formerly common in Hampshire, Dorset and much of Wales. Falk & Pont (1996) considered *H. equina* a nationally Notable species whose decline in the last century, despite an increase in horse numbers, could be attributed to changes in the use and husbandry of horses. The modern stronghold of *H. equina* was considered to be the New Forest (VC11) (Hutson, 1984; Falk & Pont, 1996). Now recent records indicate a second breeding population existing in Dartmoor National Park, Devon (VC03).

Typical of the Hippoboscidae, *H. equina* is an obligate ectoparasite feeding on the blood of its hosts, with a flight period in Britain from May to October. As its name implies, the primary host is considered to be the domestic horse, but this species has been known to maintain populations on domestic cattle (Roberts, 1925; Thompson, 1955; Maa, 1969; Askew, 1971; Hutson, 1984). Other hosts in Britain have included man and domestic dogs (Roberts, 1925; Thompson, 1955; Hutson, 1984). Additional hosts in the Palaearctic include the red deer (Kadulski, 1996), camel (Maa, 1969), rabbit (Maa, 1969) and amongst birds the grey heron (Olafsson, 1985) and northern goshawk (Kristofik & Stefan, 1980). In laboratories, *H. equina* has survived and bred on guinea pigs and also been successfully reared artificially through use of a parafilm membrane providing defibrinated bovine blood (Fouda, 1984a, b). *Hippobosca equina* is known to copulate on the host animal and gravid females are noticeable by their distended abdomens. Typical of members of the Hippoboscidae all three larval instars are passed within the uterus (Ferrar 1987; McAlpine *et al.*, 1987) and after an estimated 12 to 14 days developing in the uterus (refers to *H. maculata* L., Schuurmans Stekhoven, 1926) the fully grown larva is rapidly deposited by the female at her chosen pupation site (Roberts, 1925; Thompson, 1955; Hutson, 1984). Unlike the Glossinidae where the female deposits an active third instar larva to crawl or burrow to the pupation site, the Hippoboscidae deposit an already immobile offspring in a suitable location (Askew, 1971; Ferrar, 1987). Roberts (1925) produced the only published observations (5) of British *H. equina* depositing full grown larvae in the wild. The females were observed alighting on fronds of bracken (*Pteridium aquilinum* L.) then dropping to the earth to exude the larva. The deposited larvae were left partially buried in thick humus; all were immobile and pupated within a few hours. Of fourteen other pupae located by handsearching, twelve were found in the organic humus at the base of bracken stems, the remainder in crevices amongst the twisted roots of grass not far from bracken. Roberts (1925) reasoned that the female

H. equina required a thick humus layer, bracken and a degree of sunshine for successful breeding. This factor should be considered when contemplating searching for *H. equina* or when intending to manage suitable habitat. Thompson's review (1955) included records of *H. equina* from 1752 onwards with the first detailed record from the New Forest data ca. 1781. Also quoted was an account of Samouelle obtaining six handfuls of flies from the flanks of a horse, capturing in total over one hundred specimens. An equivalent event has not been subsequently recorded. Thompson (*op. cit.*) included a single record of *H. equina* ostensibly from Devon when some Dartmoor ponies were found to have the flies some seven days later on arrival in Cheshire. The first author first encountered *H. equina* in the late summer of 1996. A specimen was sent for verification and its identification confirmed by J. E. Chainey (pers. comm. 1996, specimen retained Natural History Museum, London). Subsequently several more records for the species have been collated from the Dartmoor area.

Devon entomologist Peter Smithers (pers. com., 1997) communicated his captures of the species in the area and his subsequent donation of specimens to the Plymouth University collection. He had captured two individuals, the first from Mary Tavy (SX5079) in July 1989 and the second from Horrabridge (SX5169) on 20.vi.1993, both localities on the fringes of Dartmoor. The first author initially encountered the species when it landed on his neck in early August 1996; this was during a short walk across Roborough Common, Dartmoor National Park (SX5064). Several more specimens were captured in the next two hours. That same month a specimen was captured when it alighted on the author's forehead on 31.viii.1996 (SX507647) and later numerous individuals were captured flying in the same area on 11.ix.1996 (SX5164 & SX5064). Roborough Common is an area of open heathland grazed by horses, sheep and occasionally cattle with areas of bracken and gorse, *Ulex europaeus* L., with rotational scrub management creating a diverse site. The following year the fly was recorded on 15.v.1997 in Holne Wood, Dartmoor (SX7070). On this occasion the encounter was on a well-worn track along the Dart River valley in the shade of mature beech, *Fagus sylvatica* Fab., and oak *Quercus* spp. The fly alighted on the first author's shoulder and quickly flew off to land on another part of his coat until he captured it on the lapel. Later in that year *H. equina* was recorded in numbers at Roborough Common on 16.ix.1997. Unfortunately no records were obtained from early 1998 to 2000 due to absence from the area but on return in August 2000 a large hippoboscid flew around the first author and alighted on a horse in the vicinity. This occurred during a brief walk on Roborough Common on 2.ix.2000. It was considered to be *H. equina* but unfortunately the example was not captured or observed closely thus preventing reliable confirmation of the record. In 2001 Foot and Mouth problems delayed all fieldwork and consequently no records were returned for *H. equina* in this year. Concerned about the continued presence of the fly in the Dartmoor area following the Foot and Mouth outbreak it was a relief to obtain a positive record for *H. equina* on 24.viii.2002, the specimen alighted on Sarah Turner's dark top during a walk across Roborough Common (SX5064). Close observation clearly revealed it as an example of *H. equina*. The continuance of records over a period of seven years from Roborough Common and the occasional captures elsewhere on Dartmoor strongly suggest that there is a local breeding population on Roborough Common with a potentially larger breeding population distributed across Dartmoor. Records for *H. equina* presented here have, without exception, been collated from incidental captures of flying adults on sunny days and not from careful examination of the host or intentional pursuit of the species therefore adding credence to the belief that the population in the area could be much greater than previously considered.

When attracted to the first author, *H. equina* was observed consistently alighting on any dark clothing worn, even when the option of lighter areas of attire were available. This attraction to coloured clothing may be attributed to colour sensitivity in this species. On one occasion, when a number of *H. equina* were in flight, they were observed alighting on two parked cars, one white and one dark green. Whilst they were more obvious to the observer on the white car's surface they were evidently more attracted to the darker vehicle and spent a significantly greater time on and around this vehicle. Furthermore, in groups of people wearing various coloured clothes and walking in *H. equina* habitat the presence of *H. equina* was restricted to those wearing darker clothing, in particular dark greens, blues and blacks. This has been a predictable, consistent and regular response to colour during the first author's experience of walking through habitat when *H. equina* has been in flight. These observations were compelling although not necessarily borne out by the observations of Roberts (1925). In his brief study on *H. equina*, colour preference was examined using six cows. The cows comprised three colours—black, blue/grey and roan. Averages of 9.8 *H. equina* were observed across the six cattle with the frequency on black being 17, 9 and 4, blue/grey 15 and 4, roan 10, respectively. Clearly, in his small experimental sample Roberts (*op. cit.*) experienced large variation between individuals as exemplified in the results from the black cattle. These observations were contradicted by those of a Mr Bentley in the summer of 1818 when he observed a preference for light coloured horses (Thompson, 1955). There has been extensive research (Green, 1994; Gibson & Torr, 1999; Briscoe & Chittka, 2001) on the visual cues employed by other Diptera. Studies on the sister group Glossinidae showed blue and black screens increased trapping success as did movement (Laveissière & Couret, 1982; Vale, 1974a, b, 1982) suggesting that qualitative field observations of live subjects may produce more robust data. There have been contradictory experiments indicating within species variation with respect to colour preference. *Lucilia sericata* (Meigen) (Calliphoridae) in the UK preferred white, yellow, aluminium, black, red then blue (Wall *et al.*, 1992) but in Hungary preferred black, blue, white then yellow (Hall *et al.*, 1995). These anomalies may be attributable to subtle experimental procedures, movement, geographical race, ultraviolet reflectance or thermal response and may explain the contradictory behaviour of *H. equina* as well as the requirement for carefully designed studies of visual cues. In *H. equina* the subject of colour choice currently remains open and despite the qualitative nature of the observations there appears to be a case for further study into the visual cues involved in host selection.

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